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ABSTRACT

This project sought to meet documented Army training needs through the application of system analytic procedures. When doctrine, regulations, and school organization were investigated, it was found that regulations were clear and comprehensive, but that school organization lacked a clear training evaluation component. During the project, the Army reorganized the schools to reflect requirements of the regulations and to permit proper execution of the new training doctrine; this change greatly increased the role of evaluation in the schools. Recommendations were made about organization and regulations, and recommended doctrine was published in detail as the Interservice Procedures for Instructional Systems Development. Lessons learned and management recommendations are presented. (Author/RAO)

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OUTCOMES OF THE INSTRUCTIONAL SYSTEMS DEVELOPMENT PROJECT

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This project sought to meet documented Army training needs through application of system analytic procedures. Doctrine, regulations, and school organization were investigated. Regulations were clear and comprehensive. School organization lacked a clear training evaluation component. During the project, the Army reorganized the schools to reflect requirements of the regulations and to permit proper execution of the new training doctrine. This change greatly increased the role of evaluation in the schools. Recommendations were made about organization and regulations and recommended doctrine was published in detail as the Interservice Procedures for Instructional Systems Development. Lessons learned and management recommendations are presented.

OUTCOMES OF THE INSTRUCTIONAL SYSTEMS DEVELOPMENT PROJECT

Robert K. Branson
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Orientation

The session for which this paper was prepared had as the central theme "Lessons Learned" in major instructional development projects. This paper will begin with the broader focus of human resources development, then concentrate on instruction as one of the major approaches to human resources development. By limiting the scope principally to training programs, it will be possible to highlight specific issues not always apparent in typical education settings.

The distinction between education and training is made here simply on the basis of the probability that the position or job classification following training is known prior to an individual's beginning the training program. For example, consider the baccalaureates in chemistry. The probability of a good prediction of their future employment when they enter college is low. At the other extreme, a sailor who enters the Navy's radioman school has a high probability of going to a radioman's job. Instruction, then, for the radioman would be training, for the chemistry major, education. Not because of the subject matter but because of the predictability of the job for which the individual was being prepared. Obviously, in this sense, instruction for which there was no occupational outcome regardless of how specific would be cast under the rubric of education. Dentistry is a training program, business is questionable, while teachers are trained, history majors, education, etc.

The Project

The project to be described in this paper was undertaken by the Center for Educational Technology (CET) at Florida State University. The Center was organized by Robert M. Morgan, Robert M. Gagné, Leslie J. Briggs, and the author in the early 1970's for the purpose of taking a systems analytic approach to the solution of human resources development problems nationally and internationally. Here, a systems analytic approach refers to the application of psychological and human factors research and development techniques to the solution of man-environment performance problems. Each of the individuals noted has detailed his own view of how such applications can best be made by presenting either theoretical treatises or the description of large-scale projects. To gain a better perspective of how these authors view the analytic approach, see, for example, Gagné 1966, 1977; Briggs, 1977; Morgan and Chadwick, 1971; Morgan 1979; and Branson, et al., 1975.

The U.S. Army Combat Arms Training Board (CATB), a highly effective and creative military training organization, approached the Center in 1973 to assist them in making a major revision and upgrading of the approach to Army training. One request made of CET was to assess the state of the art in empirically designed training technology, to identify concepts appropriate to the mission of Army schools and training centers and to recommend methods for institutionalizing these concepts within the Army school and training center system. Careful human engineering of the organization of guidance material and doctrine was essential, particularly in providing "how to do it" guidance to military and civilian training specialists within the Army school system (Branson, Stone, Hannum, and Rayner, 1973).

A second request was to employ appropriate development procedures to prepare and validate a training model with detailed guidance procedures to develop in Army personnel the skills necessary to enable them to analyze, design, develop, implement and control empirically designed instruction. It was my privilege, and I might add, a considerable professional challenge, to have been selected as the principal investigator on that project.

The CET Approach

Principally because of the orientation of the founders of the Center and based on the experience gained from a series of progressively more effective projects, a somewhat traditional systems oriented human resources development approach was taken. A brief description of that approach would be useful. It is well founded in the psychological literature that there are normally only three ways to achieve or improve the performance of individuals in their jobs. One can select people who already know how to do a job. This approach is commonly taken by commercial airlines when they hire former military pilots who have already logged thousands of hours in multi-engine service.

A second approach is taken through the provision of sufficient instruction to individuals so that they will be able to perform. In a military context, literally thousands of people are trained every day to repair vehicles and aircraft, to troubleshoot electronic systems, and so on; people who knew nothing about those systems prior to their entry into the military service.

A third approach to improving or achieving performance is through effective management and supervision. Such approaches would include the manipulation of economic incentives for sales people, for example, or

through work enrichment procedures to create more favorable working conditions and assignments for people on the job. Generally, business and industrial organizations pay far more attention to the management aspects of performance than they do to the selection and training aspects of performance.

Mager and Pipe (1970) have detailed these three approaches in a straightforward fashion. It is their view that before any effective human resources change can be made, it is first necessary to document a clear performance discrepancy. That is, to define an outcome gap between what is and what ought to be. Some of those outcome gaps will be caused by faulty selection procedures, others will be caused by skill deficiencies, while others will be caused by inadequate approaches to management. Training can only be a solution for performance discrepancies that are documented to be skill deficiences.

It is important to recognize that all human resources development programs or projects will be effective only when they are viewed as a means to the achievement of some known outcome. While that should be obvious, frequently it has been found that a large number of people view training as an end in itself rather than a means to achieve an acceptable level of performance. There is abundant literature detailing situations in which training was used as a solution to a non-training problem, and was therefore used ineffectively. One reason for the apparent failure of effective training programs is that they represent the most innocuous intervention management can take.

The processes of documenting specific outcome gaps have been detailed by Kaufman (1976). The processes of needs analysis and assessment are undertaken to establish program validity. In a training program, validity

refers to the correlation between job requirements and the instruction. An important first step in defining outcome gaps is the identification of an organization's mission. An organization should first be evaluated only against its own mission. That is important because there is often disagreement among outsiders on what an organization's mission ought to be or should be, rather than what it actually is. Kaufman also argued that it is our obligation to question an organization's mission, but, once established, the mission then becomes the guidance for the entire organization.

Once the organization's mission has been established it has been rather a straightforward matter to compare the operations of the organization to its mission including the way that the enterprise is organized, the resources available, and the use of those resources in the accomplishment of the mission. It is a fundamental requirement that results or outcomes be an important part of the total assessment procedure. Prior history has shown that we far too often get concerned with process rather than outcome. These outcomes or results must then be compared to plans or expectations. Finally the quantitative or qualitative discrepancy between results and plans becomes the operational definition of the outcome gap.

The Politics of Discrepancies

To a seasoned systems analyst, the discovery and documentation of an outcome gap represents an opportunity to apply a variety of solution alternatives. Unfortunately, to the manager of an agency or a corporate executive, the documentation of an outcome gap often becomes a political problem of considerable proportion. On the one hand it is impossible to go forward with precision in the absence of documented outcome gaps. On

the other hand the existence of a documented outcome gap often requires action on the part of the executives responsible. These actions are not always solution oriented.

When the documentation of an outcome gap is done for the purpose of establishing a political advantage, it is often the executive's tactic to discredit those who prepared the documentation. For example, in February, 1979, the General Accounting Office issued a highly critical report of Peace Corps recruiting activities, citing as evidence that the Peace Corps had "failed to interview" adequately a large number of those hired. This "discrepancy" was cited as an example of poor management on the part of the Peace Corps. Yet, fifty years of psychological research on interviewing has demonstrated that the interview is the least effective commonly employed method of employee selection.

A second approach taken to the handling of discrepancies is often that of finding someone to be the scapegoat. Whose fault is it that the training program is not working? Let's find the people responsible and replace or discipline them. This decisive executive action creates the illusion that the problem has somehow been solved when in fact it will recur. Having effectively scapegoated the problem, however, the executive can remain in place until the ultimate tragedy occurs. Scapegoating often protects individual jobs but rarely contributes to mission.

Generating Solution Alternatives

Sometimes it is possible to document discrepancies in an organization for which no one can reasonably be scapegoated. The responsibility for the problem is so diffuse that no one can be clearly blamed. It was the

fortunate case in the military ISD project to have been able to document the discrepancy in such a way that making it public did not require administrative or punitive action. Once opportunities of that kind are discovered it is possible to begin constructive deliberations on solution alternatives.

Locating Contributors

It was decided early in the military Instructional Systems Development (ISD) project to encourage wide participation as a means of generating a base of participation and support. First, we visited several Army installations to identify knowledgeable and effective staff memebers. Each of the Army's schools and training centers has a number of civilians and military personnel who are competent in the applications of a systems approach to training (SAT). The participation of these specialists in the development of the ISD materials was critical. First, they have experienced a wide range of prior training research and development activities. Second, they could serve as a responsive editorial board for the critique of any tentatively selected approach. Many of them could make particularly good estimates of what will and what will not work in various environments.

Selected people from those installations visited were invited to attend various planning and briefing sessions during the planning and design of the project. Accumulating a group of experts or specialists to address a problem is not without risks. Many participants had already made up their minds about "the" correct approach before they arrived. Fortunately, others adopted a problem solving orientation and were willing to consider a variety of solution alternatives. Those who had strongly entrenched views-whose views did not prevail--either became detractors from the project or dropped out all together. Perhaps some day we'll be able to work out

an effective method to get such groups to remain in a problem solving mode rather than a solution selling mode.

It should be noted here that the Army has worked out over the years a variety of methods for handling decision making. One of those and probably the most prevalent is that of having the senior officer present make the final decision on a project or program. Until the time that the decision is made, people are free to argue to present alternatives, to oppose others and so forth. However, after the decision is made it is expected that all others participating will execute the action plan with diligence. But, even in the Army, the better decisions are more faithfully executed than those which are suboptimal.

The Army State-of-the-Art in 1973

In addition to identifying the key people who were at the various training centers and schools in the Army, a second purpose of our visits to those installations was to define the existing state of the art. Because the Army had done the early basic research in the systems approach to training, it was decided that a clear picture of exactly where they were in 1973 would be basic to making any real improvements. Accordingly, we analyzed the training, training literature, school organization, and training of trainers status as of the first quarter of 1973.

Three important areas were analyzed and then evaluated in terms of the mission they were intended to accomplish. The first of these areas was that of finding out what the people were supposed to do and how they were supposed to do it. In the Army what people are supposed to do is spelled out in regulations, and how they are supposed to do it is spelled out in other forms of guidance. The regulation which specified what and how the Army was to train in 1973 was called the Systems Engineering of

Training, Regulation 350-100-1. That regulation, issued in 1968, had as its basis a fairly standard systems approach to training model. That model is displayed in Figure 1.

A second consideration was how people were prepared to do what they were supposed to do. Because there were a large number of people in the Army school system concerned with training and an even larger number of people attending Army schools, there must be considerable and regular attention paid to how people are prepared to their jobs. Third, after people have been prepared to do their jobs then it is necessary to have some regular and objective way of finding out how well they did their job.

The results of the preliminary studies and visits left us with a good understanding of what the Army schools were supposed to do, how the people at the schools were prepared to do their work, and how they were evaluated and informed of the quality of their work. The last element of that analysis was that of understanding how they were organized to accomplish the assigned work.

In the Systems Engineering of Training model displayed in Figure 1, the first step or function called for is that of job analysis. It follows according to management logic that if job analysis is a function required to be performed then someone should be assigned to perform that function. Further, we should be able to find on the organizational chart where in the organization that that function is performed. In this sense the organizational chart is a road map which allows us to match function to organization.

Displayed in Figure 2 is the organizational chart that was presented to us by schools we visited during 1973. We were able to track the function of job analysis down through the Deputy Commandant for Doctrine through

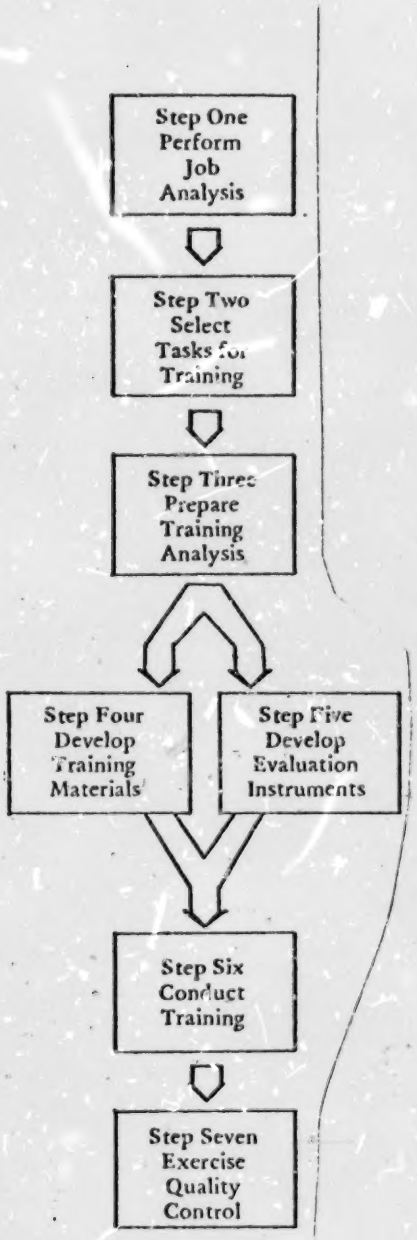

Figure 1. TRADOC Regulation 350-100-1 Training Model

SCHOOLS MODEL

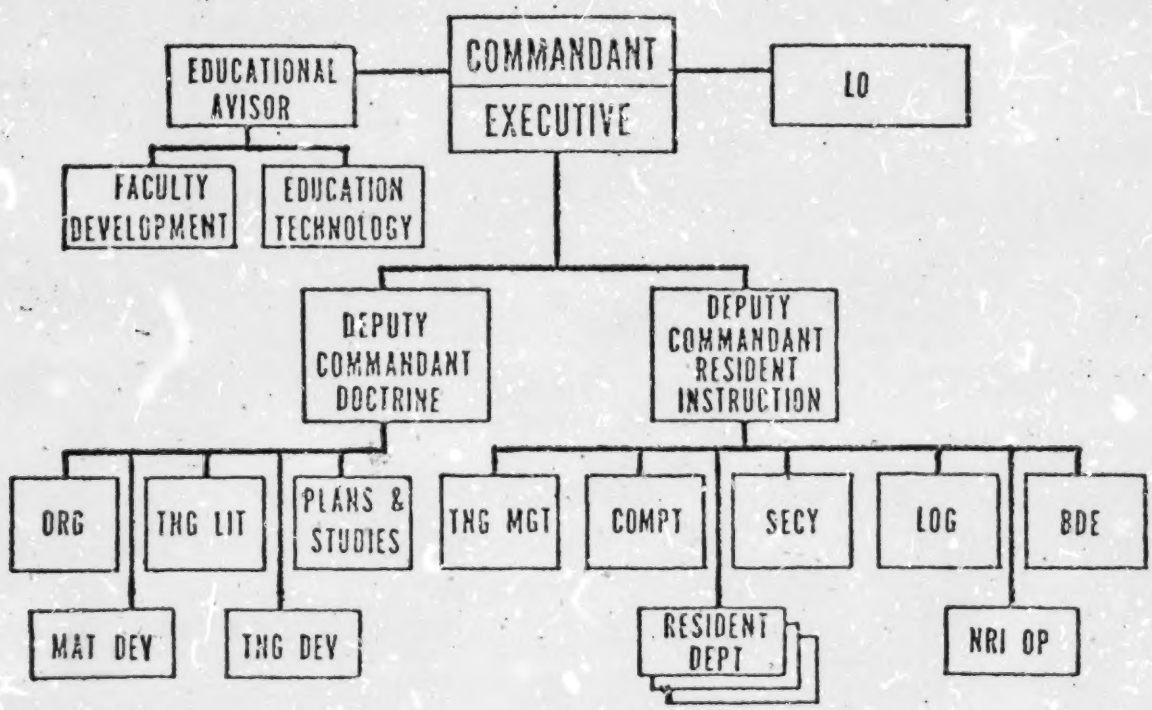

Figure 2. U.S. Army School's 1973 Organizational Chart

the Directorate of Training Development and found that organization charged with the job analysis function.

Subsequently, we tracked each of the other functions specified in the regulation down through the organizational chart until we could find the person who was actually in charge of conducting the work specified in the regulation. Each time we found a discrepancy between what was called for in the regulation and what was actually being done, either organizationally or functionally within the school, we documented that discrepancy.

Putting the -ing in Training

Fundamental to the theory of a systems approach is the notion of control. Control refers to the process of planning, executing the plan, obtaining results, comparing the results to the plan, and acting on the discrepancies. Because there are many elements of a training system, identifying the method of control becomes a key aspect of analyzing the effectiveness of the organization.

Consider as an example an accounting department. In the accounting department, accountants apply standard procedures and techniques to each of the accounts on a periodic basis and present periodic reports. The purpose and form of those reports is specified in advance and the person in charge of accounting makes certain that each of the accountants applies the specified procedures in a craftsmanlike manner. Individual accountants are not free to handle their accounts according to their own whim. Further, any deviations from standard practice are documented and explained. Not only are accounts managed, and accountants managed, but the entire process of accounting is managed to meet specifications and, accordingly, is controlled.

Applying that model to training would require that specified plans be made for the trainees, that the trainers would conduct training according to specification and, that the results of training would be compared to those plans, discrepancies documented, and action initiated on these discrepancies.

In the Army school's model, we were unable to identify any evidence that training as such was being controlled. Trainers were being trained and trainees were being trained by trainers, but the results of that training were not compared to the plan by anyone specifically charged with that responsibility. While it may be true that people in various departments had interest in certain operations data about training, no one was charged with the responsibility for documenting training results.

Based on this analysis of the regulation and the organization of the schools, we documented this major organizational deficiency in a consultants' report to the president of CATB in 1973.

Our interviews with training specialists in the field identified many who claimed that the regulation under which they were operating was not a good regulation. A consultant group, HumRRO, was hired to investigate the application of the regulation at the Army aviation school. While that report contained many useful recommendations which were followed in the ISD project regarding ways to improve the regulation itself and its documentation and evaluation procedures, no mention was made of the fact that the school was not organized to implement the regulation (Ricketson, Schulz & Wright, 1970).

One viewpoint from which the ISD project analysis was made included the following basic tenant: If a function, result, task, or outcome is <u>everyone's</u> responsibility, it will not get done. Applying this rule to the

Army's 1973 school organization, the evaluation and control of training was widely dispersed in the organization and as a consequence did not occur in a meaningful and deliberate way.

While there are no "laws" which apply universally in training management, and there is no such thing as the correct organization, a number of reliable principles have emerged over the years which work more often than not. We have generally approached new situations with these principles in mind. The first six laws of training management:

1. Systems, models, designs, and equipment do not achieve results. Managers do.
2. If a function, result, task, or outcome is everyone's responsibility, it will not get done.

   Corollary: A manager can only handle N-1 collateral duties. (One less than the number already assigned.)
3. Any activity which is not thoroughly checked, or inspected according to specification or requirement will not be done according to specification or requirement.
4. Incumbents in any job (mechanics or instructors) do not want to learn how to do it our way--they want to do it their way, no matter how historically ineffective.
5. An enterprise must be adequately organized and resourced to accomplish mission.

   Corollary: Training and education are resource sinks; no quantity of resources will ever be perceived as adequate.
6. To be effective, a management systems analyst must pick a problem to work on which is big enough to be important but for which no one can reasonably be blamed.

Our conclusion in 1973 was that the regulation was perfectly adequate for the intended purpose. There was insufficient guidance, examples, and training provided for people to follow the regulation but those are peripheral issues to the question of the quality of the regulation. Thus, if the regulation has all of the attributes of an SAT model, there is little point in revising. What was required was detailed guidance, training, and manager training.

At that point in the project, we tried to summarize the data that had been gathered so that we could test the quality of our inferences about the status quo. It was important that these inferences be as accurate as possible since they would serve as the basis for all future plans.

In that context, it occurred to us that placing the blame on the regulation was a clever rationalization on the part of the managers. Perhaps not even a conscious one. What we found was, to us, a clear violation of the first law of training management: Systems, procedures, models, and machines do not produre reulsts; managers do.

The violation was not that the managers were not working hard or that they were ignoring the duties, it was that no specific training results were required and no one was responsible for achieving (or evaluating) those results. Results in this context refers solely to outcomes, not processes. The Army was certainly diligent in applying the training process.

An effective solution would require not only a means for specifying and measuring outcomes, but also, an organizational recognition that a senior manager must be held accountable for the achievement of those outcomes. To achieve an organizational recognition of those outcomes would require a major reorganization of the schools. That reorganization was clearly beyond the scope of work for which we had been contracted,

and more importantly, well beyond the decision authority of our sponsoring agency. Consequently, we were not optimistic about a fundamental change.

The Development Plan

By early summer of 1973 we had completed the analysis of the state-of-the-art in training in the Army (Task I) and, with the assistance of a number of training experts, had been able to outline the project plan. This plan included the development of an Army training model (to replace the one in the systems engineering regulation), development of a detailed set of procedures to provide training guidance to users, technical level workshops, workshops for the immediate supervisors of technical work, and workshops for senior managers. The workshops for the supervisors and managers were thought to be the most critical feature of the project. This management emphasis was based on the assumption that supervisors cannot readily achieve results they do not understand.

In addition to the specifications for completing the project, a methodology was established in which each of the major program elements would be developed, critiqued, and thoroughly staffed before proceeding to the next step. While this process of printing and distributing draft materials was time consuming, it was absolutely essential. The process of assimiliating and interpreting the critique and suggestions was difficult at best. Often, we found ourselves torn between two equally effective alternative approaches, being able to use only one of them for consistency purposes. Finally, we projected a requirement to use the materials for a period of 18 months, visit installations where they were being used, conduct an in-depth evaluation of the use of the materials, and then do a final version based on the formative data accumulated during the tryout of the draft. Unfortunately, that revision did not occur.

It is difficult to be sure why the revision did not take place according to schedule. Some of the reasons centered around the change in project officer and a change in organization of CATB. There was also a small group of powerful civilians called "education advisers," whose jobs we had recommended to be eliminated or restructured during the Task I study, and there was a change in TRADOC at the highest levels. Perhaps the contractor was simply ineffective in convincing the Army that the final version was necessary--they still issue the draft version.

Mission Drift

Hardly a month had passed following the award of the contract for the development of an Army model and set of Army procedures when we encountered an organization called the Interservice Training Review Organization (ITRO). A subcommittee of that organization was at the time attempting to standardize training terminology among the services. For those of you in the university community, this task was akin to that of trying to get several schools within a state university system to agree on common courses. It always sounds so logical on the face of it until one actually tries to execute a plan.

Upon hearing of our project, that ITRO committee approached the Army with the proposal that the model and procedures being developed for them be converted to an interservice sponsorship, that is, the project would be supervised by respresentative members of the Army, Navy, Air Force and Marine Corps. In the interest of interservice harmony, the Army agreed to that proposal.

While it seems reasonable that it ought to be possible to prepare training materials which would be useful to all members of the armed forces, that reasonableness applies only to principles, rules, generalizations, concepts and the like. It does not work at all when one attempts to describe training problems, training procedures, sources and uses of data, and other service specific requirements. Clearly, our mission had begun to drift. It is often difficult to please everyone. Fortunately, at that time, the project manager assigned by the Army remained the same. As all defense contractors are aware, high quality projects cannot be completed if high quality project managers are not assigned to complete them.

It is the duty of the project manager to keep the contractor clearly oriented toward the mission and objectives. Such a responsibility is particularly important when it is necessary to work with a large number of people in order to complete the project. Often, working with a large number of people permits the introduction of noise into the system. The government project manager must taken into account the legitimate suggestions and concerns of those participating while, at the same time, keeping the project on track so that the outcome will be in their best interests.

Late in the project, we went through the rather shocking experience of a change of project manager. The first project manager was a highly rated lieutenant colonel in the regular Army. When he was reassigned overseas, he was replaced by an energetic, technically competent captain in the Utah National Guard. Imagine your all-American high school quarterback suddenly being sent to the Dallas Cowboys. Captains, no matter how brillant, do not vote as much stock as lieutenant colonels.

We believe the lesson learned here is that it is not in the best interest of the contractor to change project managers in the middle of the project unless one can make a substantial change for the better. We believe this lesson would generalize across a wide range of projects.

Results

The outcomes of the project can be described in two major categories: Those which were expected and those which were not. The major expected outcome of the project was the publication of all of the draft materials developed. These materials included:

- Interservice ISD Model (See Figure 3)
- The manuals published in the Army as TRADOC Pam 350-30 and in the Navy as NAVEDTRA 106A
- The workshop materials, including the exercises and the workshop director's guide
- A slide/tape presentation which provides an overview of the entire set of procedures.

All of the materials described above are referenced at the end of this paper with their document acquisition numbers so that interested civilians can find them accessable.

A significant element in the Task I problem analysis was that of the organizational structure of the Army school system. Perhaps the most dramatic unexpected outcome during the entire project was the reorganization of the Army school system. Following the publication of the manuals (in late 1975), the Army issued a draft organizational chart for the school systems in 1976. This revised organization is referred to as School Model '76, is presented as Figure 4. Of particular interest, in Figure 4 is the Directorate of Evaluation which has been placed on

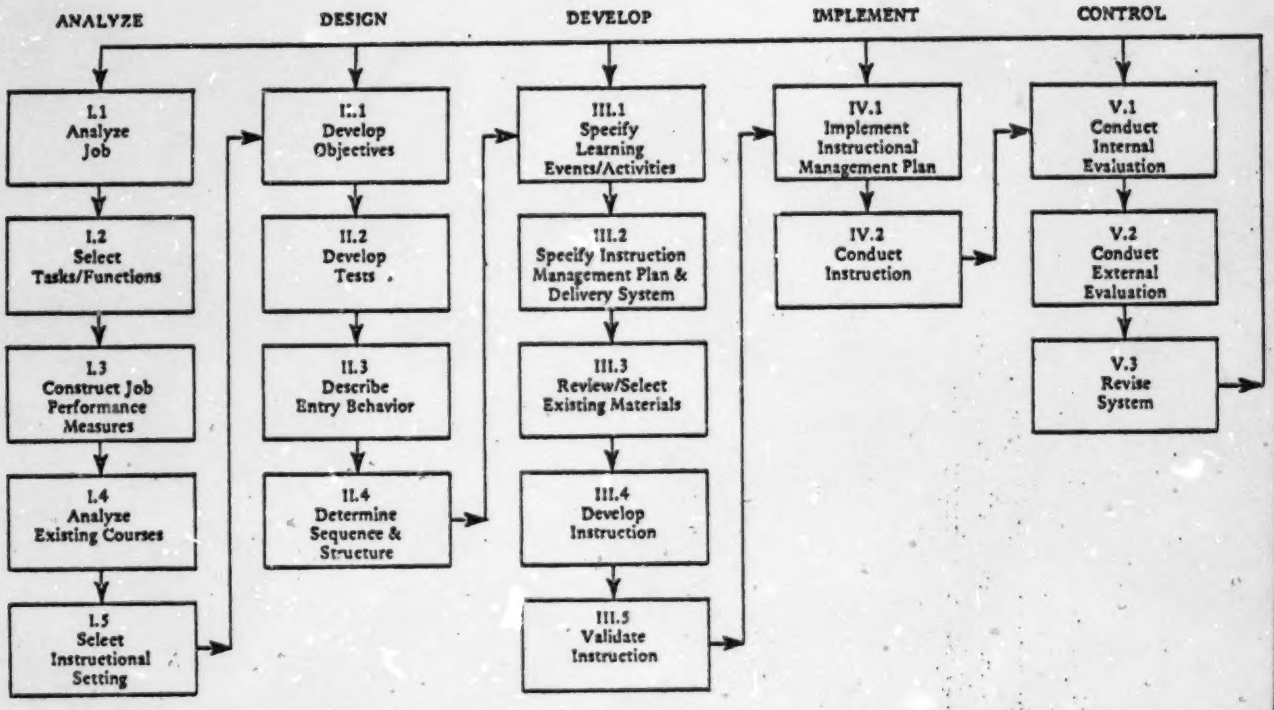

Figure 3. Interservice Procedures for Instructional Systems Development Model (TRADOC Pam 350-30)

STRUCTURING FOR PROGRESS

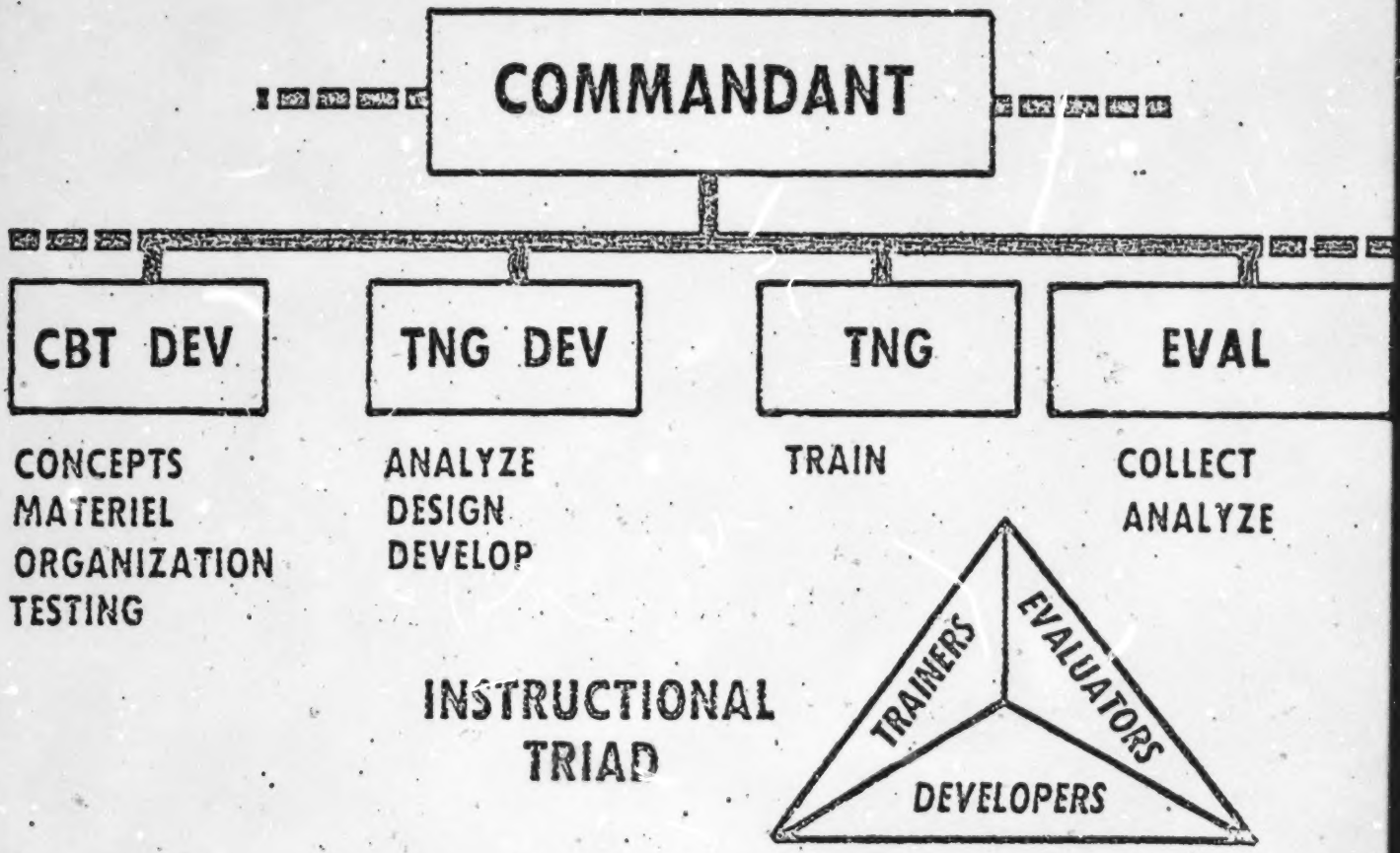

Figure 4. U.S. Army School Model 1976

an equal level with all other major divisions of the organization. What this means is that the Directorate of Evaluation, which previously did not exist, now is on the same level as the Directorate of Training Development, the Directorate of Training, and the Directorate of Combat Development. Now, the people who develop the content of training work in a different department than those who develop the training and training materials. Those who conduct the training are in a different department from those who evaluate the outcomes of training. This independence of major function provides a system of checks and balances which permits feedback to be channeled to appropriate elements of the organization as a means of improving outcomes, and the potential for gaining control.

Figure 5 shows how the relationship between the organizational departments relates to the phases of the ISD model. The Directorate of Training Development is responsible for Phases I, II, and III of the ISD Model. The Training Directorate is responsible for Phase IV of the ISD Model. And Phase V, Evaluation, is placed in the Evaluation Directorate. The School Model '76 represents a considerable conceptual improvement over the prior organization since it placed equal emphasis on the evaluation of outcomes as it does with the conduct of training processes. If this training organization can be kept in place long enough for its systematic attributes to mature and operate, it will have been a major contribution to school management.

A second unexpected outcome was that the final version of the materials was not completed. A thorough revision was planned based on broad and sufficient usage data in the Army. The revision was to have been similar to a revision of instructional materials based on formative evaluation

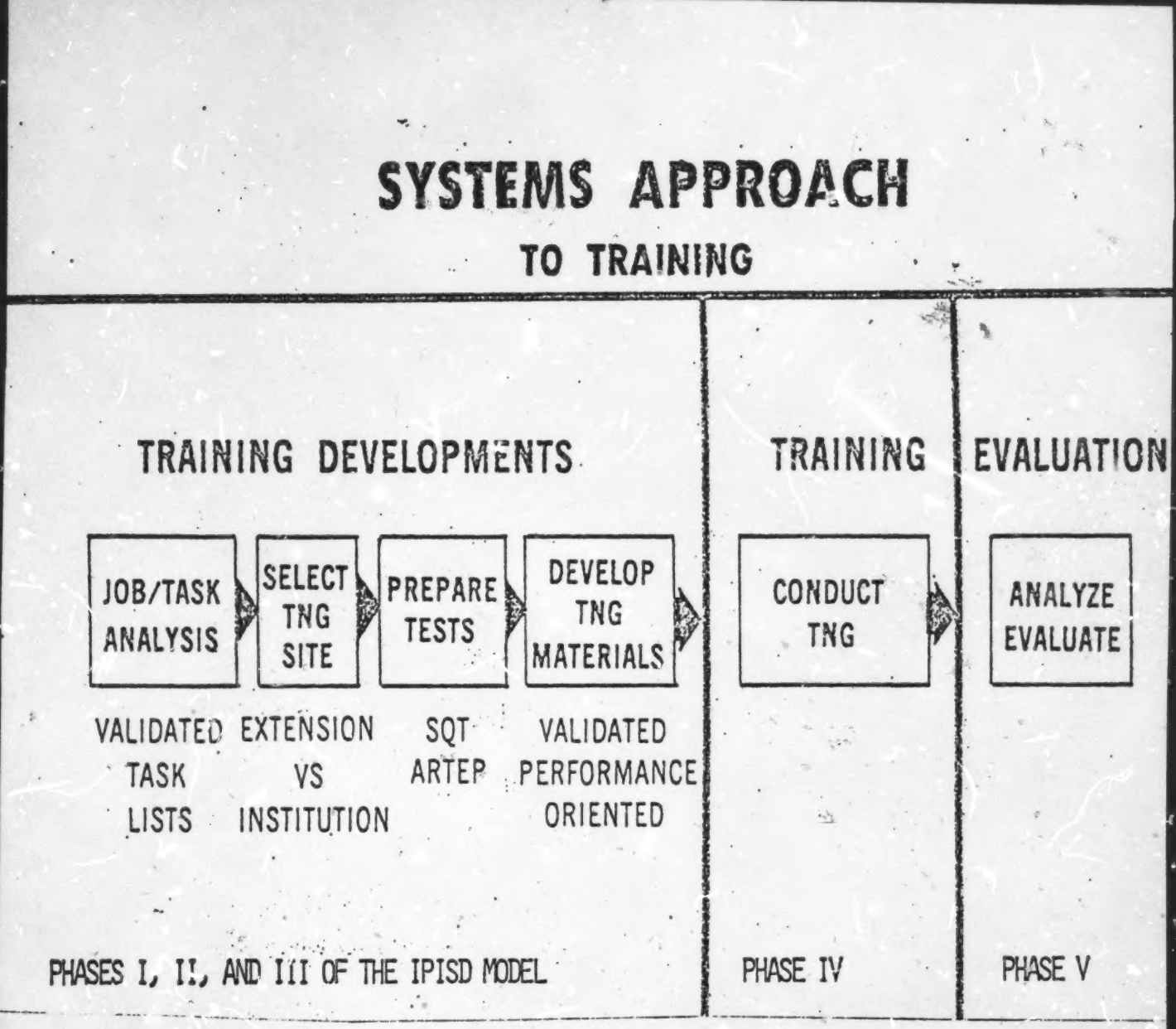

Figure 5. Relationship between Organization Departments and Phases of the ISD Model

data. As a consequence, many rough edges (and perhaps some huge potholes) remain in the materials. Such revisions cannot be competently done by people not thoroughly familiar with the principles upon which the procedures are based.

What we fear, and there is evidence to support this fear, is that the potholes and rough edges will be identified by some users. These users will try to remove the portions of the doctrine offensive to them, even though that section or step was a fundamental part of the principles being established. If this practice continues, the integrity of the entire model can be degraded.

The third unexpected outcome was the degree of resistance among several civilian education advisers within the school system. One the one hand, they were unable to muster really significant support for their resistance, but on the other hand, they did create a substantial block to implementation. Fortunately, their protest was ill-timed. Had they put forth their maximum effort at the time the project director was changed, or at other times of partial confusion, they could have increased their chances to prevent the publication of the materials.

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